

National Health Insurance database in Taiwan: a resource or obstacle for health research?

To the Editor,

We recently read with interest the correspondences between Hamspon & Weaver and Kao [1,2]. In particular, Kao has mentioned several advantages of using the National Health Insurance (NHI) data in observation-epidemiology studies [2]. Although we agree that the NHI database is a valuable resource for health research in Taiwan, we would like to point out some potential issues of using this nationwide healthcare data to investigate population health status.

The NHI system in Taiwan covers over 99% of Taiwanese citizens and collects routine data on daily medical services [3]. Indeed, the database records important information on the usage of health services and provides opportunities for researchers to examine the cross-sectional or longitudinal associations between different health conditions [4] as well as potential risk factors and determinants [5,6] based on their prior hypotheses and research questions. However, the analysis of healthcare data may have some important methodological limitations and over-relying on the NHI database could limit the development of robust health research in Taiwan.

Since the NHI data is based on the usage of health services across the country, subjective opinions on clinical diagnoses and medical prescriptions might vary across individual physicians or specialists in different clinical contexts. Any variations or associations reported from the dataset might be related to different diagnostic methods and treatment choices as well as changes in medical knowledge over time (see the example of dementia [7]). True relationships between different health conditions or risk factors could be difficult to examine in the secondary healthcare data as the complexity of diagnosis, clinical decisions and co-morbidity have been de-contextualised and aggregated into single insurance codes. Although the NHI is a nationwide healthcare system, it cannot provide robust estimates for important epidemiological measures such as prevalence, incidence and risk factors at the population level.

The findings from the NHI database are clearly based on those who were aware of their health problems and approached medical services. Under this condition, the issue of self-selected bias is unavoidable and the results could be misled and excluded those in disadvantaged situations. In addition, the literature on Berkson's fallacy has showed that significant but spurious associations could be generated due to inappropriate conditional factors such as hospitalisation [8,9]. The classical example is a negative association between diabetes and

cholecystitis in the hospital-based data while this relationship can be attributed to the condition of hospitalisation, which should be the consequences of these two diseases [8].

Due to the methodological limitations, findings from the NHI data might not provide comprehensive evidence to inform clinical practices and policy planning. The usage of medical services is not equal to health status in the general population and it is clear that the NHI database can only provide information on secondary (early detection and screening) or tertiary prevention (reducing risk of disability and poor prognosis). Strategies for primary prevention, improvement of health conditions in the general population across life courses, need to be supported by robust evidence from primary investigations, which have clear research questions, sound study design and sampling plan, appropriate measurement and analytical methods [10]. Observational studies based on the NHI database should also have these fundamental elements as well as conduct possible sensitivity analyses to address the potential uncertainty and bias.

In recent years, health research within medical institutions in Taiwan is increasingly being driven by the hospital accreditation system where research output is measured and scored by the percentage of clinical staff that published in peer review journals each year. In academia, institution and researcher performance is also evaluated based on limited criteria that favour high quantity of published papers in Science Citation Index (SCI) and Social Science Citation Index (SSCI) journals. The NHI database therefore serves as a convenient vehicle for producing publishable research requiring relatively smaller investments and within a shorter period of time, and quickly became the sole research of choice for many institutions. Little evaluation has been done on the translational impact of this body of research, examining change in national treatment guidelines, health policies and clinical decision making, and furthermore the improvement of the health status of the population. Over-relying on this 'cost-effective' approach may not benefit the health research and evidence-based medicine and policymaking in Taiwan. We believe it is an area that requires more scrutiny by the health research community in Taiwan.

Yu-Tzu Wu

University of Exeter, Exeter, United Kingdom

Email: y.wu3@exeter.ac.uk

Hsin-yi Lee

Luke International, Mzuzu, Malawi

Email: hlee@lukeinternational.no

References

- [1] Hampson NB, Weaver Lk. Carbon monoxide poisoning and risk for ischemic stroke. *European Journal of Internal Medicine*. 2016. <http://dx.doi.org/10.1016/j.ejim.2016.01.006>
- [2] C-H Kao. Reply letter to the comments. 2016. <http://dx.doi.org/10.1016/j.ejim.2016.02.002>
- [3] Wu T-Y, Majeed A, Kuo KN. An overview of the healthcare system in Taiwan. *London J Prim Care*. 2010; 3(2): 115–119.
- [4] Lai CY, Chou MC, Lin CL, Kao CH. Increased risk of Parkinson disease in patients with carbon monoxide intoxication: a population-based cohort study. *Medicine* 2015; 94(19):1–6.
- [5] Chou C-Y, Chou Y-C, Chou Y-J, Yang Y-F, Huang N. Statin use and incident dementia: A nationwide cohort study of Taiwan. *International Journal of Cardiology*. 2014;173(2):305–310
- [6] Chen L, Lu H-M, Shih S-F, Kuo KN, Chen C-L, Huang LC. Poverty related risk for potentially preventable hospitalisations among children in Taiwan. *BMC Health Serv Res*. 2010;10:196.
- [7] Brayne C, Davis D. Making Alzheimer's and dementia research fit for populations. *The Lancet*. 2012;380(9851):1441-3.
- [8] Snoep JD, Morabia A, Hernández-Díaz S, Hernán MA, Vandenbroucke JP. Commentary: A structural approach to Berkson's fallacy and a guide to a history of opinions about it. *International Journal of Epidemiology*. 2014;43(2):515-21.
- [9] Pearce N, Richiardi L. Commentary: Three worlds collide: Berkson's bias, selection bias and collider bias. *International Journal of Epidemiology*. 2014;43(2):521-4.
- [10] von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, for the STROBE initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet* 2007;370:1453–57